IN THE CLAIMS:

The following listing of claims replaces all prior versions and listings of claims in this application:

1. (Currently Amended) A pass/fail judgment device which takes the form of pass/fail objects as a pass/fail judgment factor, and which is used to detect a defective unit in product inspection, comprising:

a discriminant function computing unit for computing discriminant functions which give variables used to separate the frequency distributions of a pass category and a fail category from a plurality of pieces of parameter information which make pass/fail judgment factors and pass/fail judgment result information, wherein each of the frequency distributions of the pass category and the fail category has a shape of a normal distribution ~~thereof~~;

a statistical parameter computing unit for computing a center of distribution and distribution parameters ~~indicating~~ that vary in accordance with a breadth of a distribution for said variables with respect to either or both of said pass category and said fail category;

a threshold determining unit for determining a threshold for providing a pass/fail judgment based on the value of a variable and giving a specific distribution probability that is based on at least one of a rate of flowout in the fail category, which represents a number of pass/fail judgment objects ~~contained~~ that are actually in the fail category and that are judged as being passed, and a rate of overcontrol in the pass category, which represents a number of pass/fail judgment objects ~~contained~~ that are

actually in the pass category and that are judged as being failed, relative to said center of distribution and said distribution parameters;

a parameter information acquiring unit for acquiring a plurality of pieces of parameter information on one or more pass/fail judgment objects according to data of a normal distribution; and

a pass/fail judging unit for comparing the value of variables obtained by substituting the parameter information into said discriminant function with said threshold and for thereby providing a pass/fail judgment for the one or more pass/fail judgment objects;

wherein the overcontrol and flowout are separated having the normal distribution,

wherein the overcontrol and flowout are judged based on the data of the normal distribution

~~wherein the threshold determining unit separates the overcontrol and flowout having the normal distribution; and~~

~~wherein the pass/fail judgment unit has a standard deviation which is based on the normal distribution~~.

2. (Previously Presented) The pass/fail judgment device according to Claim 1, wherein

said statistical parameter computing unit computes a mean and standard deviation of said fail category, and

said threshold determining unit takes as said threshold said variable value equivalent to a value which is away from said mean of said fail category by a constant multiple of the standard deviation thereof.

3. (Previously Presented) The pass/fail judgment device according to Claim 2, wherein

said statistical parameter computing unit computes the mean and standard deviation of said pass category, and

said threshold determining unit judges by what multiple of the standard deviation the threshold determined by said mean and standard deviation of said fail category is away from said mean of said pass category, and thereby computes a rate of occurrence of said overcontrol with that threshold.

4. (Previously Presented) The pass/fail judgment device according to Claim 1, wherein

a plurality of pieces of said parameter information is obtained by converting specified inspection data obtained as the result of inspecting a plurality of said pass/fail judgment objects with a specified inspecting instrument in advance into parameters which represent different pass/fail judgment factors by a plurality of different conversion expressions, and is stored in a specified storage medium, and

a plurality of pieces of parameter information on said pass/fail judgment objects acquired by said parameter information acquiring unit and the results of pass/fail

judgment by said pass/fail judging unit are additionally stored in the specified storage medium.

5. (Previously Presented) The pass/fail judgment device according to Claim 4, wherein

the judgment device comprises a unit for inputting the results of visual pass/fail judgment on said pass/fail judgment objects,

said pass/fail judgment result information indicating the results of said visual pass/fail judgment is correlated with the parameter information on said pass/fail judgment objects, and

if the results of pass/fail judgment by said pass/fail judging unit and the results of said visual pass/fail judgment are different from each other, the results of the visual pass/fail judgment are additionally stored as correct judgment results in said specified storage medium.

6. (Original) The pass/fail judgment device according to Claim 4, wherein

the judgment device comprises a unit for inputting the causes for visual pass/fail judgment and the results of the visual pass/fail judgment on said pass/fail judgment objects,

either or both of said pass category and fail category are subdivided by cause for the pass/fail judgment and taken as said pass/fail judgment result information, and

said discriminant function computing unit computes discriminant functions which give variables which separate the frequency distributions of the subdivided pass category and fail category.

7. (Previously Presented) The pass/fail judgment device according to Claim 1, wherein

in computing discriminant functions having as a variable any of a plurality of said parameters, the discriminant function computing unit computes correlation coefficients between the parameters, counts the number of parameters which give a correlation coefficient not less than a predetermined value in said pass category and said fail category, disuses parameters having a high count, and repeats this processing to eliminate multicolinearity.

8. (Original) The pass/fail judgment device according to Claim 1, wherein

in computing discriminant functions having as a variable any of a plurality of said parameters, said discriminant function computing unit disuses parameters in increasing order of priorities given to the parameters in advance, and repeats this processing to eliminate multicolinearity.

9. (Original) The pass/fail judgment device according to Claim 1, wherein the judgment device comprises:

an electromagnetic wave applying unit for irradiating pass/fail judgment objects with predetermined electromagnetic waves;

an electromagnetic wave detecting unit for detecting reflected electromagnetic waves or transmitted electromagnetic waves produced as the result of the application of the electromagnetic waves; and

an electromagnetic wave data generating unit for generating electromagnetic wave data from the detection values of reflected electromagnetic waves or transmitted electromagnetic waves detected by the electromagnetic wave detecting unit, and

said discriminant function computing unit and said parameter information acquiring unit substitute said electromagnetic wave data into a plurality of different conversion expressions to compute values corresponding to the forms of pass/fail judgment objects, and take the computed values as a plurality of pieces of said parameter information.

10. (Original) The pass/fail judgment device according to Claim 9, wherein the judgment device comprises:

a positional information acquiring unit for acquiring positional information on pass/fail judgment objects; and

an arrangement analyzing unit for, when electromagnetic waves reflected by a plurality of pass/fail judgment objects more than once are detected by said electromagnetic wave detecting unit, grasping the arrangement of the pass/fail judgment objects from said positional information, and

said discriminant function computing unit disuses or gives lower priorities to said parameters to which said electromagnetic waves reflected more than once greatly contribute.

11. (Currently Amended) A pass/fail judgment method taking the form of pass/fail objects as a pass/fail judgment factor for detecting a defective unit in product inspection, comprising:

computing discriminant functions which give variables which separate frequency distributions of a pass category and a fail category from a plurality of pieces of parameter information which make pass/fail judgment factors and pass/fail judgment result information thereof wherein each of the frequency distributions of the pass category and the fail category has a shape of a normal distribution;

computing a center of distribution and distribution parameters ~~indicating~~ that vary with a breadth of a distribution for said variables with respect to either or both of said pass category and said fail category;

determining a threshold for providing a pass/fail judgment based on the value of a variable value and giving a specific distribution probability based on at least one of a rate of flowout in the fail category, which represents a number of pass/fail judgment objects ~~classified~~ that are actually in the fail category that are ~~actually~~ judged as being passed, and a rate of overcontrol in the pass category, which represents a number of pass/fail judgment objects ~~classified~~ that are actually in the pass category that are

~~actually~~ judged as being failed, relative to said center of distribution and said distribution parameters;

acquiring a plurality of pieces of said parameter information on one or more pass/fail judgment objects according to data of a normal distribution; and

comparing the value of variables obtained by substituting the parameter information into said discriminant functions with said threshold; and

displaying a pass/fail judgment for the one or more pass/fail judgment objects based on the comparing step;

wherein the rate of overcontrol and flowout ~~have~~ are separated having the normal distribution; and

wherein the pass/fail judgment ~~has a standard deviation~~ are judged based on the normal distribution.

12. (Currently Amended) A pass/fail judgment method taking the form of pass/fail objects as a pass/fail judgment factor for detecting a defective unit in product inspection, comprising:

a discriminant function computing step in which discriminant functions which give variables which separate the frequency distributions of a pass category and a fail category are computed from a plurality of pieces of parameter information which make pass/fail judgment factors and pass/fail judgment result information thereof wherein each of the frequency distributions of the pass category and the fail category is the shape of a normal distribution;

a statistical parameter computing step in which a center of distribution and distribution parameters ~~indicating~~ that vary in accordance with a breadth of a distribution for said variables are computed with respect to either or both of said pass category and said fail category;

a threshold determining step for determining a threshold for providing a pass/fail judgment based on a value of a variable representing a specific distribution probability based on at least one of a rate of flowout in the fail category, which represents a number of pass/fail judgment objects that ~~should be classified~~ are actually in the fail category, ~~but~~ and that are judged as being passed, and a rate of overcontrol in the pass category, which represents a number of pass/fail judgment objects that ~~should be classified~~ are actually in the pass category, ~~but~~ and that are judged as being failed, relative to said center of distribution and said distribution parameters;

a parameter information acquiring step in which a plurality of pieces of said parameter information on one or more pass/fail judgment objects are acquired according to data of a normal distribution; and

a pass/fail judging step in which the value of variables obtained by substituting the parameter information into said discriminant functions are compared with said threshold, and a pass/fail judgment for the one or more pass/fail judgment objects is displayed based on the comparison with said threshold;

wherein the rate of overcontrol and flowout ~~have~~ are separated having the normal distribution; and

wherein the pass/fail judging step ~~has a standard deviation~~ are judged based on the normal distribution.

13. (Currently Amended) A multivariate statistics analyzer which is capable of communication of data with the outside through a communication interface and executes a multivariate analysis program under the control of a predetermined operating system, wherein

said multivariate statistics analyzer comprises a hard disk drive which is capable of accumulating the multivariate analysis program and transmitting, receiving, and accumulating data,

said multivariate analysis program comprises modules corresponding to a mode classifying portion which includes parameter value data consisting of parameter values which are correlated with at least pass/fail judgment result data of one or more pass/fail judgment objects as a pass/fail judgment factor, and which are used to detect a defective unit in product inspection when the data is externally acquired through said communication interface and stored in said hard disk drive and are actually computed with respect to each component, and subdivides categories based on the accumulated data;

a discriminant function computing portion which eliminates multicolinearity, gives variables used to separate frequency distributions of a pass category and a fail category from a plurality of pieces of information which make pass/fail judgment factors and pass/fail judgment result information, wherein each of the frequency distributions of the

pass category and the fail category has a shape of a normal distribution, and further computes discriminant functions based on said parameter value data;

a statistical parameter computing portion which computes a center of distribution parameters and ~~including~~ that vary in accordance with a breadth of a distribution for variables with respect to either or both of a pass category and a fail category, and the mean and standard deviation in the frequency distributions of said pass category and said fail category with respect to said discriminant functions; and

a threshold determining portion for determining a threshold for providing a pass/fail judgment based on the value of a variable defined by a specific distribution probability based on at least one of a rate of flowout in the fail category, which represents a number of pass/fail judgment objects ~~that should be classified~~ are actually in the fail category, ~~but~~ and that are ~~actually~~ judged as being ~~classified in the pass category~~ passed, and a rate of overcontrol in the pass category, which represents a number of pass/fail judgment objects that ~~should be classified~~ are actually in the pass category, ~~but~~ and that are actually judged as being ~~classified in the fail category~~ failed, relative to said center of distribution and said distribution parameter, and

the threshold determining portion further performs the operations of acquiring said discriminant function data, said parameter value data, and pass/fail judgment result data, generating a histogram corresponding to a pass/fail judgment result on a category-by-category basis, computing a mean and a standard deviation of each category in the generated histogram, determining the threshold of a discriminant function corresponding to a specified rate of flowout which is set for the fail category

and indicates the range in which defective units are let out, based on the mean and standard deviation computed in the fail category and the rate of flowout; and

a pass/fail judgment display portion configured to display a pass/fail judgment for the one or more pass/fail judgment objects based on the threshold determined by the threshold determining portion;

wherein the overcontrol and flowout are separated having the normal distribution; and

wherein the overcontrol and flowout are judged based on the data of the normal distribution.

14. (Original) The multivariate statistics analyzer according to Claim 13, wherein

said threshold determining portion is externally fed with said rate of flowout and determines the threshold of said discriminant function so that the inputted rate of flowout will be obtained.

15. (Original) The multivariate statistics analyzer according to Claim 14, wherein

said threshold determining portion determines as a threshold the range from the mean to four times the standard deviation which is considered to be the range corresponding to said rate of flowout.

16. (Previously Presented) The multivariate statistics analyzer according to Claim 13, wherein

said threshold determining portion judges the suitability of said determined threshold of discriminant function based on the mean and standard deviation computed in a pass category and said specified rate of overcontrol which is set for said pass category and indicates the range in which non-defective units are judged as defective units.

17. (Original) The multivariate statistics analyzer according to Claim 16, wherein

said threshold determining portion judges the suitability of said threshold depending on whether the threshold falls in the range from the mean to nine times the standard deviation which is considered to be the range corresponding to said rate of overcontrol.

18. (Currently Amended) A quality control apparatus which takes the form of pass/fail objects as a pass/fail judgment factor and which is used to detect a defective unit in product inspection, comprising:

a statistical computing unit configured to receive object data representing one or more characteristics of an object and compute at least one of a first probability that the object will be classified in a first category and a second probability that the object will be classified in a second category based on the received object data wherein each of the

frequency distributions of the first probability and the second probability has a shape of a normal distribution;

an input unit configured to receive at least one of a rate of flowout in the second category, which represents a number of objects that ~~should be classified~~ actually are in the second category that are actually ~~judged as being~~ classified as being in the first category, and a rate of overcontrol in the first category, which represents a number of objects that ~~should be classified~~ actually are in the first category that are ~~actually~~ judged as being ~~classified~~ in the second category;

a calculation unit configured to calculate a discriminate function to discriminate between one or more objects classified in the first category from one or more objects classified in the second category based on the at least one of the rate of flowout in the second category and the rate of overcontrol in the first category received by the input unit and based on at least one of the first and second probabilities computed by the statistical computing unit;

a judging unit configured to determine whether one or more objects should be classified in one of the first and second categories based on the discriminate function calculated by the calculation unit; and

a communication unit configured to communicate whether the object is classified in one of the first and second categories based on the determination of the judging unit;

wherein the judging unit has a standard deviation based on a normal distribution of the objects.

wherein the overcontrol and flowout are separated having the normal distribution; and

wherein the overcontrol and flowout are judged based on the data of the normal distribution.

19. (Previously Presented) The quality control apparatus of claim 18, wherein the one or more characteristics of the object include label data and form data.

20. (Previously Presented) The quality control apparatus of claim 18, wherein the first category comprises a pass category, which represents a group of one or more objects that satisfy a predetermined criteria, and the second category comprises a fail category, which represents another group of one or more objects that do not satisfy the predetermined criteria.

21. (Previously Presented) The quality control apparatus of claim 18, wherein the first category comprises a group of one or more objects that have a higher degree of quality than another group of one or more objects in the second category.

22. (Previously Presented) The quality control apparatus of claim 18, further comprising a detector configured to detect physical characteristics of the object and communicate the detected physical characteristics of the object to the statistical computing unit.

23. (Previously Presented) The quality control apparatus of claim 22, wherein the detected physical characteristics of the object include an orientation of one component of the object relative to another component of the object.

24. (Previously Presented) The quality control apparatus of claim 22, wherein the detector comprises a laser inspecting instrument.

25. (Previously Presented) The quality control apparatus of claim 18, wherein the at least one of the rate of flowout and the rate of overcontrol comprises a visual observation by an operator of an actual orientation of one component of the object relative to another component of the object.

26. (Previously Presented) The quality control apparatus of claim 25, wherein the visual observation by the operator occurs after the statistical computing unit has computed at least one of the first and second probabilities.

27. (Previously Presented) The quality control apparatus of claim 18, wherein the discriminate function is different from a midpoint between a mean value of a first probability distribution and a mean value of a second probability distribution.

28. (Previously Presented) The quality control apparatus of claim 18, wherein the communication unit comprises a display unit arranged to provide a visual representation of whether the object is classified in one of the first and second categories based on the determination of the judging unit.

29. (Currently Amended) A computer-implemented quality control method taking the form of pass/fail objects as a pass/fail judgment factor for detecting a defective unit in product inspection, comprising:

receiving object data representing one or more physical characteristics of an object;

computing a first probability distribution, which represents a probability that one or more objects should be classified in a first category, based on the received object data;

computing a second probability distribution, which represents a probability that one or more objects should be classified in a second category, based on the received object data;

wherein each of the frequency distributions of the first category and the second category has a shape of a normal distribution,

computing a center of distribution and distribution parameters that vary in accordance with a breadth of distribution for said variables with respect to either or both of said first category or said second category;

receiving ~~an~~ a rate of flowout in the second category, which represents a number of objects that should be classified in the second category, but are actually judged as being classified in the first category relative to said center of distribution and said distribution parameters;

receiving ~~an~~ a rate of overcontrol in the first category representing a number of objects that should be classified in the first category, but are actually judged as being classified in the second category relative to said center of distribution and said distribution parameters;

calculating a discriminate function to discriminate between one or more objects that should classified in the first category from one or more objects that should be classified in the second category based on the first and second probability distributions computed by the statistical computing unit and based on at least one of the received rate of flowout and the received rate of overcontrol;

determining whether one or more objects should be classified in one of the first and second categories based on the discriminate function calculated by the calculation unit; and

communicating the determination of whether the one or more objects are classified in one of the first and second categories to an operator;

wherein the rate of overcontrol and ~~the rate of~~ flowout are separated having ~~have a~~ normal distribution; and

wherein the ~~object classification determination has a standard deviation~~ overcontrol and flowout are judged based on the data of the normal distribution.

30. (Previously Presented) The computer-implemented quality control method of claim 29, wherein the one or more physical characteristics of the object include label data and form data representing one or more structural features of the object.

31. (Previously Presented) The computer-implemented quality control method of claim 29, wherein the first category comprises a pass category, which represents a group of one or more objects that satisfy a predetermined criteria, and the second category comprises a fail category, which represents another group of one or more objects that do not satisfy the predetermined criteria.

32. (Previously Presented) The computer-implemented quality control method of claim 29, wherein the first category comprises a group of one or more objects that have a higher degree of quality than another group of one or more objects of the second category.

33. (Previously Presented) The computer-implemented quality control method of claim 29, further comprising detecting physical characteristics of the object and communicating the detected physical characteristics of the object to the statistical computing unit.

34. (Previously Presented) The computer-implemented quality control method of claim 33, wherein the detected physical characteristics of the object include an orientation of one component of the object relative to another component of the object.

35. (Previously Presented) The computer-implemented quality control method of claim 29, wherein the received rate of flowout and the received rate of overcontrol comprise a visual observation by the operator of an actual orientation of one component of the object relative to another component of the object.

36. (Previously Presented) The computer-implemented quality control method of claim 29, wherein the discriminate function is different from a midpoint between a mean value of the first probability distribution and a mean value of the second probability distribution.

37. (Currently Amended) A computer-implemented quality control apparatus used to detect a defective unit in a product inspection, comprising:

a detector configured to detect physical characteristics of an object and generate object data representing the detected physical characteristics of the object;

a statistical parameter computing unit configured to compute a center of distribution and distribution parameters that vary in accordance with a breadth of distribution for variables with respect to either or both of a non-defective object probability ~~distribution~~ representing a probability that one or more objects should be

classified in a non-defective category based on the object data generated by the detector, compute a defective object probability ~~distribution~~ representing a probability that one or more objects should be classified in a defective category based on the object data generated by the detector, classify the one or more objects as being in the non-defective category based on a match between a first pattern of object data and the computed non-defective object probability ~~distribution~~, and classify the one or more objects as being in the defective category based on a match between a second pattern of object data and the computed defective object probability ~~distribution~~;

an input unit configured to receive a rate of flowout in the defective category, which represents a number of objects that ~~should be classified~~ are actually in the defective category by the statistical computing unit, ~~but~~ and that are ~~actually~~ judged as being ~~classified in the~~ non-defective ~~category~~, and a rate of overcontrol in the non-defective category, which represents a number of objects that ~~should be classified~~ are actually in the non-defective category by the statistical computing unit, ~~but~~ and that are ~~actually~~ judged as being ~~classified in the~~ defective ~~category~~, the received rate of flowout and the received rate of overcontrol including a visual observation by an operator of an actual orientation of one component of the object relative to another component of the object;

a calculation unit configured to calculate a discriminate function to discriminate between defective and non-defective objects based on the non-defective category and defective object probability distributions computed by the statistical computing unit and based on the feedback data received by the input unit, the discriminate function being

different from a midpoint between a mean value of the first probability distribution and a mean value of the second probability distribution wherein each of the frequency distributions of the non-defective category and the defective category has a shape of a normal distribution;

a judging unit configured to determine whether the one or more objects should be classified in one of the defective or non-defective categories based on the discriminate function calculated by the calculation unit; and

a display unit configured to display whether the one or more objects are classified in one of the defective or non-defective categories based on the determination of the judging unit;

wherein the rate of overcontrol and the rate of flowout ~~have a~~ are separated having the normal distribution; and

wherein the ~~judging unit has a standard deviation which is~~ overcontrol and flowout are judged based on the data of the normal distribution.

38. (Currently Amended) A computer-implemented quality control method taking the form of pass/fail objects as a pass/fail judgment factor, and used to detect a defective unit in product inspection, comprising:

detecting physical characteristics of an object;

generating object data representing the detected physical characteristics of the object;

computing a non-defective object probability distribution representing a probability that one or more objects should be classified in a non-defective category based on the generated object data;

computing a defective object probability distribution representing a probability that one or more objects should be classified in a defective category based on the generated object data;

classifying the one or more objects as being in the non-defective category based on a match between a first pattern of object data and the computed non-defective object probability distribution;

classifying the one or more objects as being in the defective category based on a match between a second pattern of object data and the computed defective object probability distribution;

receiving an rate of flowout in the defective category, which represents a number of objects that ~~should be classified~~ are actually in the defective category, ~~but~~ and that are ~~actually~~ judged as being ~~classified in the~~ non-defective ~~category~~, the received rate of flowout including a visual observation by an operator of an actual orientation of one component of the object relative to another component of the object;

receiving ~~an~~ a rate of overcontrol in the non-defective category, which represents a number of objects that ~~should be classified~~ are actually in the non-defective category, ~~but~~ and that are actually ~~judged as being classified~~ in the defective category, the received rate of overcontrol including a visual observation by an operator of an actual orientation of one component of the object relative to another component of the object;

calculating a discriminate function to discriminate between one or more objects classified in the non-defective category from one or more objects classified in the defective category based on at least one of the received rate of flowout and the received rate of overcontrol and based on the computed non-defective and defective object probability distributions, the discriminate function being different from a midpoint between a mean value of the computed non-defective object probability distribution and a mean value of the computed defective object probability distribution wherein each of the frequency distributions of the non-defective category and the defective category has a shape of a normal distribution;

determining whether one or more objects should be classified in one of the defective or non-defective categories based on the calculated discriminate function; and

displaying an image that illustrates whether the one or more objects are classified in one of the defective or non-defective categories based on the determining step;

wherein the rate of overcontrol and the rate of flowout are separated having ~~have a~~ normal distribution; and

wherein the ~~judging unit has a standard deviation which is~~ overcontrol and flowout are judged based on the data of normal distribution.